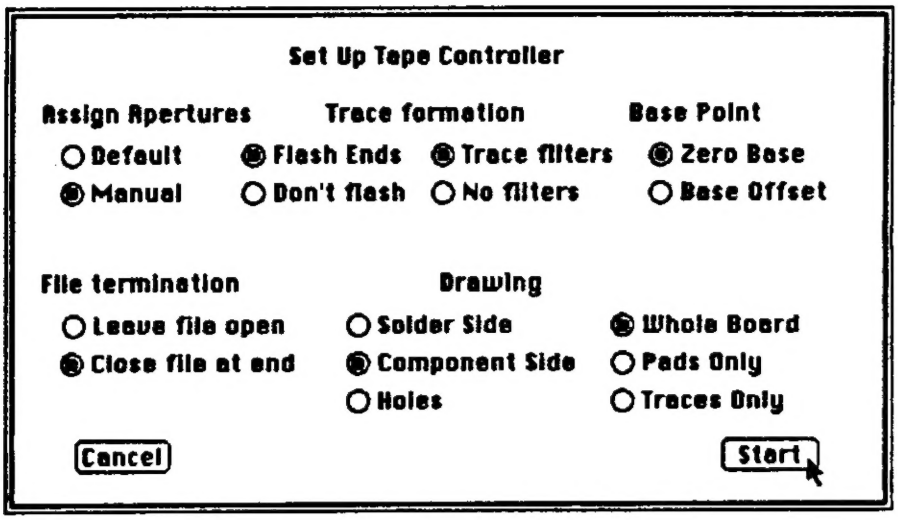
Douglas CAD/CAM
Gerber Compatible
File Creator Software

One of the many advantages of the Douglas CAD/CAM System is the variety of output formats available to you. The Gerber Compatible File Creator software reads a Douglas CAD/CAM layout file and an aperture file to produce the necessary formatted information to drive a Gerber (or Gerber compatible) photoplotter. The formatted data is in Gerber ASCII form and is written to disk. This file is then used by a photoplotter house of your choice to generate the desired artwork.

The ability to create custom pads and traces is yet another advantage of the Douglas system. If you plan on getting output from a Gerber photoplotter, it is essential that before you begin your design, you must determine your photoplotting source. This first step is critical to assure that the apertures available on the photoplotter can accommodate the pads and traces called out in your design.

An aperture is a template-like shape through which light passes to create pads, traces and shapes while exposing film, which, when developed, produces your final artwork. The light is passed through a specific aperture that can be square, round, oval or custom-made to your requirements. If the pads and traces called out in your design do not exactly correlate with the apertures available on the photoplotter, your design may be unplottable except by alternative photoplotters or by pen plotting. Therefore, it is imperative that you obtain a list of the apertures available from whomever does your photoplotting before beginning your design.

In addition to the Gerber, Gerber compatible photoplotters such as the Fire 9000 can be used to produce your artwork from the Gerber ASCII formatted file. The Fire 9000 uses lasers to plot the apertures. There are differences between the two photoplotters that require unique selections when assigning apertures. For this reason, you must also know the type of photoplotter to be used so the proper selections can be made. Make sure you know the details mentioned above before proceeding.



ASSIGN APERTURES: In most circumstances, you should use **Manual** assignment. Default does not allow you to view or edit apertures; the file goes directly to plot.

TRACE FORMATION: Unless you are working on a Gerber that provides this feature automatically, you will need to select **Flash Ends**. Select **Don't Flash** when using the Fire 9000. **Trace Filters** should always be selected on the Gerber photoplotter because lines require a filter. For this reason, unique aperture assignments are required for lines and round pads of like size. Select **No Filters** for the Fire 9000 because this photoplotter accepts common apertures for lines and round pads (it considers a circle a line of zero length).

BASE POINT: **Zero Base** will assign absolute coordinates to the file. If you are going to be plotting more than one file on a single piece of film, **Base Offset** should be used to specify the placing of these additional files. A dialog box will appear asking for the new horizontal and vertical base. They must be between 0 and 0.032".

NOTE: The ability to plot more than one file on a piece of film is a unique feature of the Gerber Compatible File Creator program. It allows optimal use of film because you have the ability to place files in any configuration you wish. Remember to select **Close file at end** from the **FILE** pull-down menu to indicate to the operator when a new piece of film should be used for the next plot.

FILE TERMINATION: To produce file marks at the end of each plot, select **Close file at end.** A separate piece of film will be used when a file mark is encountered.

DRAWING: Select the side of the board to be plotted. The program defaults to the Component side so it is good to start with this side. If **Pads only, Traces only** or **Holes** are to be plotted, make the appropriate selection to reflect your choice. When one of these selections is made, apertures will only be assigned to the specified items. For example, no traces will be listed in the aperture table when **Pads only** is selected for plot.

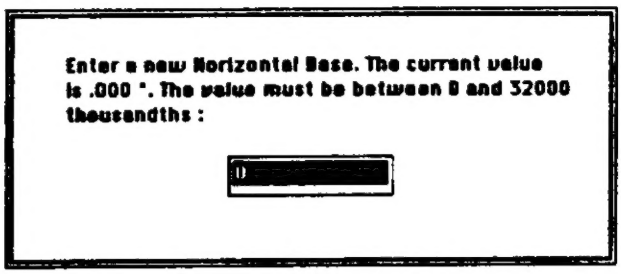
Selecting holes in the drawing category will produce a drillmaster or soldermask layer if desired. Padmasters and soldermask artwork may be created by either of two different methods. By using the "holes" option, all of the hole locations may be written back to disk with each hole size represented by a pad. For soldermask artwork, always specify a pad at least 0.015" larger than the size of the copper pad.

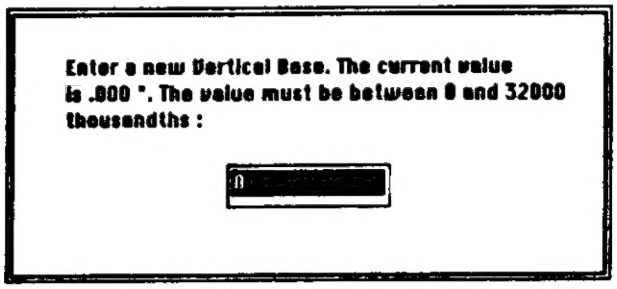
NOTE: The component and solder sides represent the primary file. If you have supplemental layers, you will need to select each file separately. You will be instructed to do so at a later time.

After you have completed the dialog box,

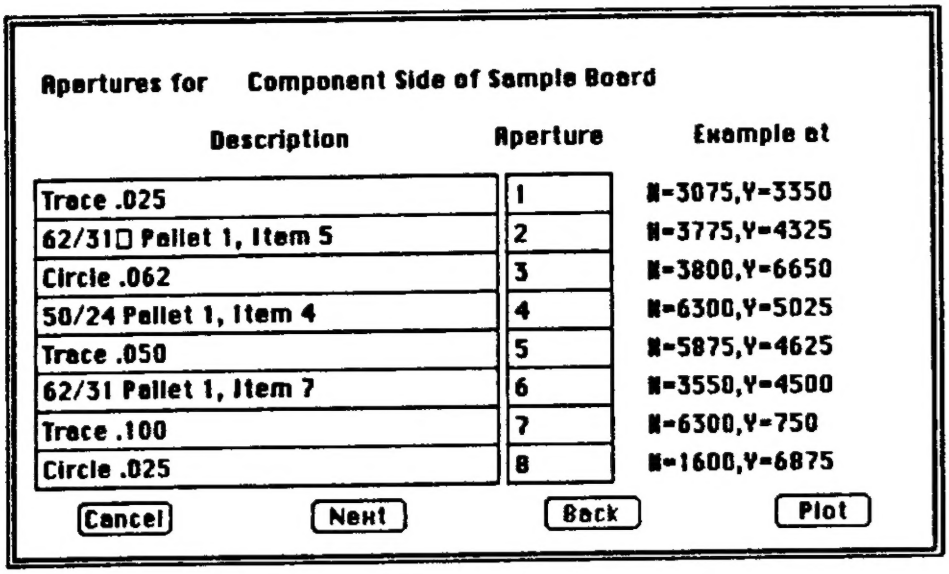
- **Click on Start.**

If you selected Base Offset when setting up the tape controller, dialog boxes will appear asking you to specify the values for the horizontal and vertical bases. Type in your desired values and press Return.





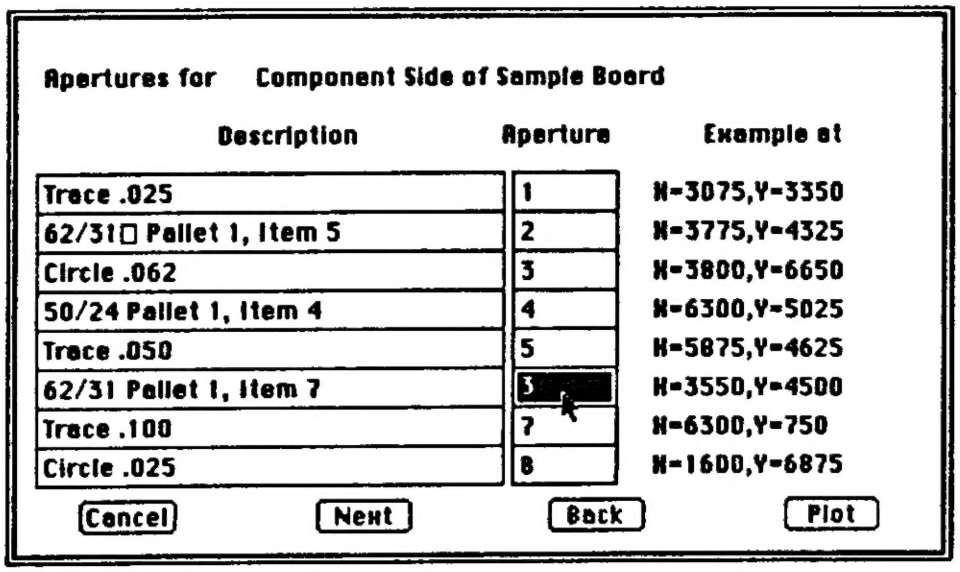
The program first reviews the file while the X and Y locators in the lower right corner of your screen change rapidly. Then a table like the one below is displayed. The table gives a description of the aperture and the number the program has assigned it. An example of any given aperture can be found on the layout at the X,Y coordinates provided in the table.



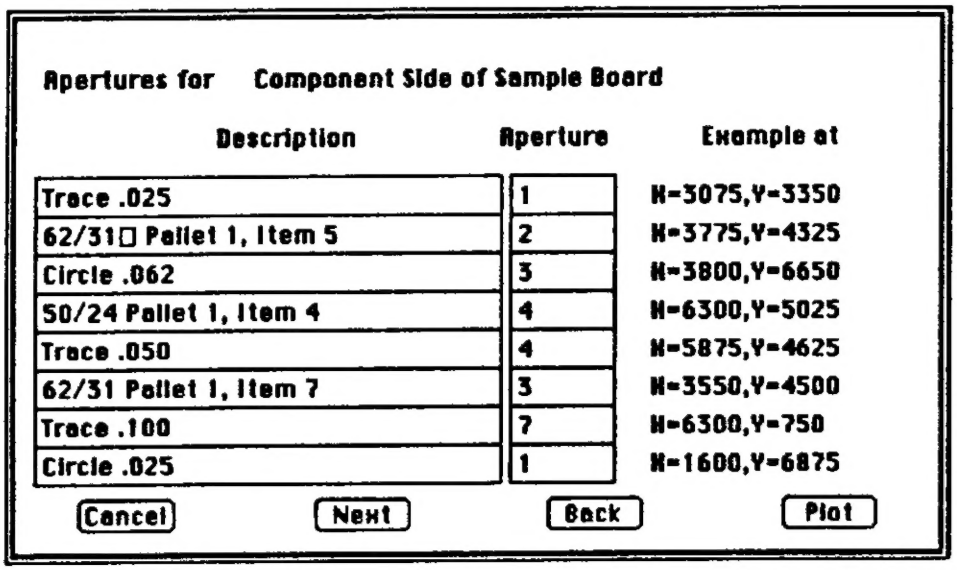
Apertures have been numbered to correspond with each line item. The type of photoplottter being used (Gerber or Fire 9000) will determine whether or not you'll want to change these program-assigned apertures.

Any pads that have been created with the same outside diameter and different inside diameters can be photoplotted with the same aperture. Any such apertures should be changed so the two agree. Unlike the Gerber, the Fire 9000 accepts common apertures for lines and round pads of the same size because a circle is considered a line with zero length. However, when two different shaped apertures other than lines and circles appear with the same outside diameter, they must always be treated independently, regardless of the type of photoplotter used.

The examples that follow show how apertures should be combined for files plotted on the two types of photoplotters. Notice that traces and circles are treated the same on the Fire 9000 (a circle is a line of zero length). On the Gerber, however, traces and circles are assigned unique apertures. Also notice that the .062 square and the .062 circle were not given the same aperture number for either of the photoplotters. Only two apertures with the same shape can be assigned the same aperture number.



Combining apertures for photoplotting on a Gerber.

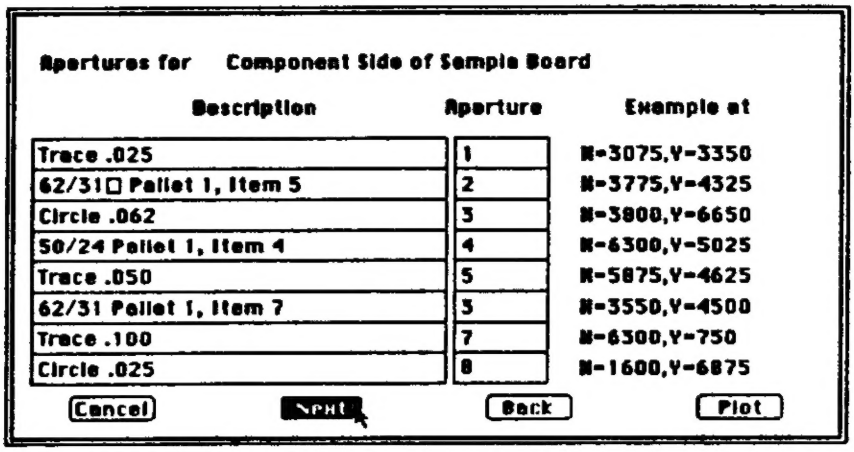


Combining apertures for photoplotting on a Fire 9000.

If any of the apertures can be combined, make the appropriate reassignments at this time. To do so, position the cursor on the aperture number to be changed and type in the new value from the keyboard.

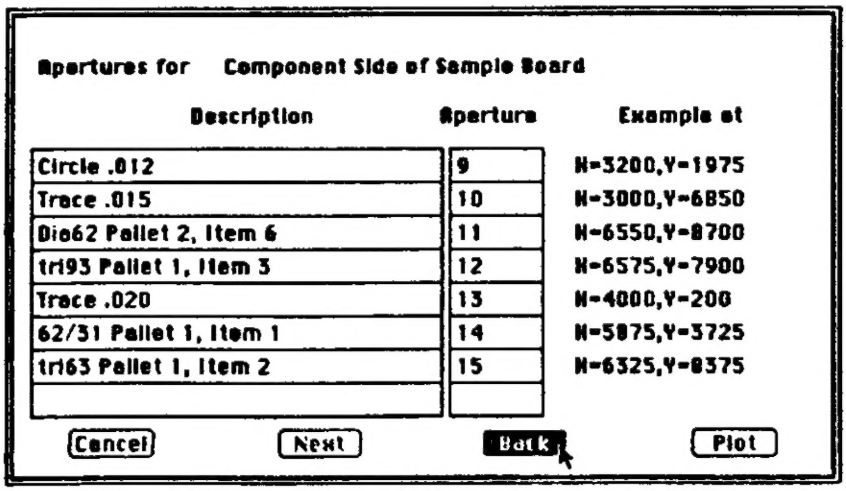
If you have more than eight different elements in your design, you will have more than one table of aperture settings to review. This will be indicated by the word Next appearing in bold letters at the bottom of the aperture table.

• **Click on Next to view the remaining apertures.**



The apertures are listed in continuing numerical order. Continue to review these assignments for the same conditions outlined above. When you have completed the assignments on this table, or find you need to go back to reference previous assignments:

• **Click on Back.**

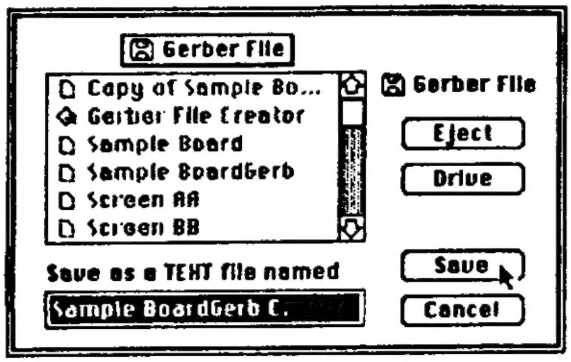


This will return you to the original aperture window. Now you are ready to write the data to disk.

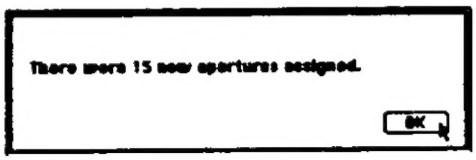
• **Click on Plot.**

The Gerber Compatible File Creator reads these apertures assignments. This information together with the layout file will produce the necessary formatted data to drive a Gerber (or Gerber compatible) photoplotter.

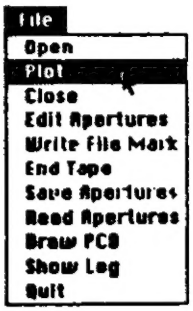
A dialog box will appear naming the newly created text file. The name you choose should reflect the file type. We will name our example file "Sample BoardGerb C. to represent the Component side. Click on Save when complete.



A message will then appear informing you that the file is being written to disk. If new apertures where assigned, another message will be shown with the total number of reassigned apertures. Click OK.

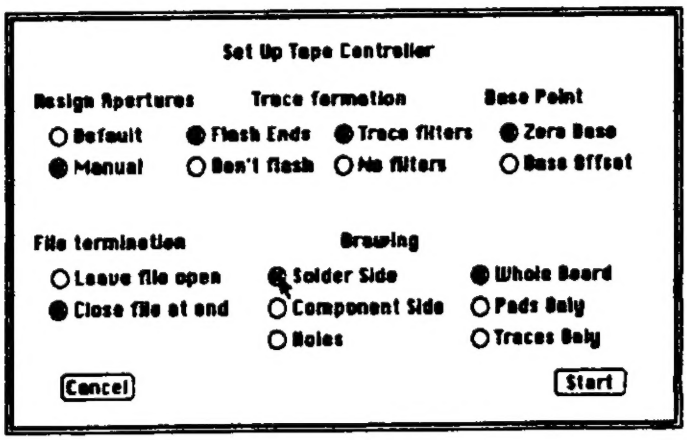


Your screen will now appear blank. You are ready to continue with the reverse side (in this case, the solder side) of the board file you are currently writing to disk. The same procedure is used.



• Select Plot from the FILE pull-down menu.

The Select Apertures screen will appear as before. Select the reverse side of what was previously selected for plotting. Select any other desired options.



• Click on Start.

A table will appear with your solder side apertures. Your apertures should correspond to those already assigned on the Component side. Additional assignments may appear for apertures that were not present on the Component side.

The program assigns a different aperture to opposite sides of a pallet item if the two sides do not appear to be identical. If the two sides are the same, the one aperture will be described by the word "Pallet". If the two sides are different, the two apertures will be described as "Solder" and "Component" apertures. Examples are as follows:

Pallet 1, Item 1..... First possible item is the same on both sides
Solder 2, Item 1.....Solder side of first item in second pad menu
Component 5, Item 7.....Component side of last (7th) item in last (5th) pad menu

NOTE: Apertures assigned previously but not needed for the current plot are marked "not used".

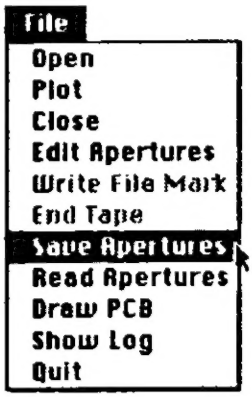
If necessary, reassign numbers for those apertures that can be combined.

- **Click on Plot.**

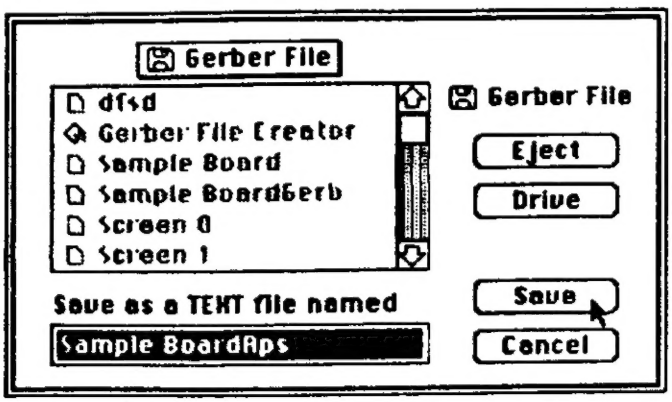
- **Name the file and click on Save.**

At this point, you should <u>always</u> save the apertures to create a stored list you can read into other layout files. To do so,

- **Select Save Apertures from the FILE pull-down menu.**



A name will appear in the dialog box. The name you choose should describe which plots the aperture file is used for. For example, "Sample BoardAps" is an appropriate name for the aperture list we just created.



- **Click on Save.**

Apertures are then stored in a text file and can be read into a layout plotted at a later time. The advantage of reading a stored aperture list into other files is that common apertures will automatically be given the aperture number previously assigned to them. This will decrease the amount of manual aperture assigning you must do when plotting a number of files at a time. Any apertures not found in the stored list are assigned a new aperture number.

When the apertures are stored in a text file, they can be printed by text processing programs. This hard copy is a good source to pass on to the photoplotter house as it lists all of your aperture assignments. You can add descriptions of apertures for your custom pads as well as any special instructions into the text file before printing.

You can also get a paper copy of the aperture assignments by producing a dump of the aperture tables while they appear on your screen.

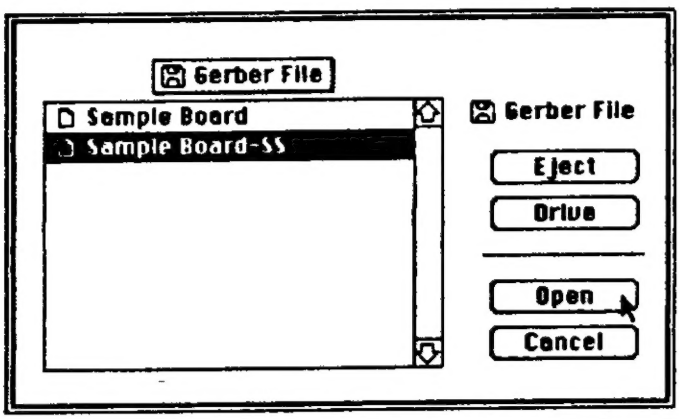
If you have no other files to convert,

- **Select Quit from the FILE pull-down menu.**

Otherwise, you can continue to convert your remaining files.

- **Select Open from the FILE pull-down menu.**

- **Select any supplemental layers associated with the current file and click on Open.**



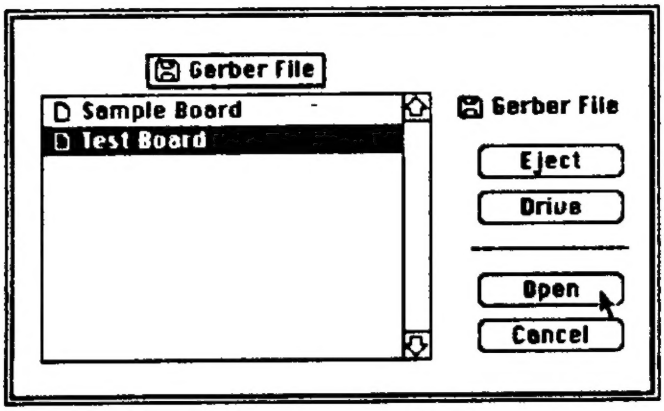
NOTE: Since files are converted and plotted one side at a time, you have the flexibility to plot only the sides you need. If you will be converting supplemental layers, plot only the component side. Do <u>not</u> plot the solder side as it has already been done while reformatting your primary layout.

Repeat the previous steps to complete the conversion of all supplemental layers for this board. Remember to name the files to represent the different layers.

Now you are ready to convert additional layouts that have been created with the same pads as the first layout. You can read in the stored aperture list from the first main file you converted only if the same pads have been used.

• Select Open from the FILE pull-down menu.

• Select the new layout file to be converted and Open.

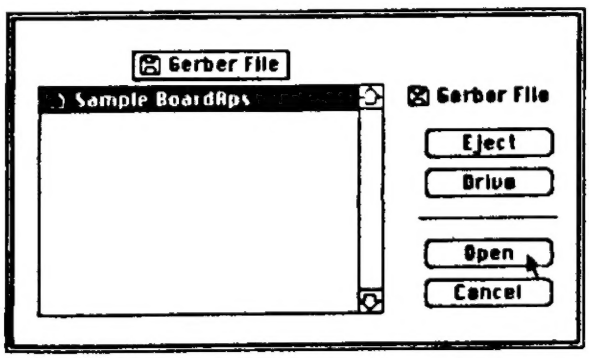


• Select Read Apertures from the FILE pull-down menu.

A listing of files will appear.

• Select the aperture list to be read into the new file.

The stored aperture list is the file you should be reading into new layouts.



• Click on Open.

You will not see anything on your screen. If you would like to view the apertures,

• Select Edit Apertures from the FILE pull-down menu.

WARNING: After reading an Aperture List TEXT File, double check the apertures appearing in the table. The program recognizes pallet positions but not pallet descriptions. If pallet positions containing different items across files are present, the program does not differentiate and will not assign a new number.

For example, if Pallet 1, item 1 in File "X" is 0 round and Pallet 1, item 1 in File "Y" is 75 square, the program recognizes both of them as the same Pallet 1, Item 1. They will be assigned the same aperture. If your pallet items are not the same across files, you can manually assign new numbers after reading a TEXT file, or you can generate a new file and instruct the photoplotter operator to change the wheel.

If you need to make any adjustments to the assignments, do so now. When the list is complete,

- **Click on OK.**

- **Select Plot from the FILE pull-down menu.**

Follow the procedures previously discussed to convert the new layout.

When there are no more files to be converted:

- **Select Quit from the FILE pull-down menu.**

The creation of a Gerber compatible formatted file is now complete. The files that have been written to disk will now enable you to obtain artwork directly from any Gerber compatible photoplotter.

FILE Menu Items

Open:	Allows you to open a layout file to be plotted.
Plot:	Assigns apertures to the file selected for plot.
Close:	Puts a layout file away.
Edit Apertures:	Allows you to change apertures that have already been assigned an aperture number.
Save Apertures:	Stores apertures from memory to disk.

Read Apertures:	Loads apertures from disk into a layout file. This makes it easier to use the same aperture wheel when plotting a number of files.
Draw PCB:	Draws the layout file in the top window. This may be a full board or a pattern you are viewing.
Show Log:	Shows a listing of the functions the program has completed to that point. Gives the names of files converted, apertures lists saved and apertures lists read into other files.
Quit:	Leaves the Gerber File program and returns you to the Macintosh mini-finder screen.

NOTE: Only the above listed menu items can be used with the Gerber Compatible File Creator program. Write File Mark and End Tape are never highlighted for your use.

THE APERTURE FILE

The aperture file is a standard Macintosh TEXT file which can be read by Edit, MacWrite, MockWrite, BASIC and many text-processing programs. A line beginning with a semi-colon ";" is a comment that is ignored by the software when the file is read. Each data line describes an aperture as it appears in the aperture-table dialogs. This is the information the photoplotter house needs to load the aperture wheel for your files.

Drill Tape Creator

The Douglas CAD/CAM Drill Tape Creator program provides drill information in Excellon format for the purpose of controlling printed circuit board drilling machines. It is expected that the program will also be used for many other applications where it is desired to control an X-Y table as a byproduct of circuit board design. Applying solder paste is an example of how the Drill Tape Creator software may be used for other applications.

The software requires input files that have been created on the Douglas CAD/CAM Print, Plot or Professional System layout programs.

Output from the program is available either as a disk file in Macintosh text format or as direct output over a Macintosh serial port. Serial port output may be used to control a paper tape punch or for direct connection to another computer or drilling machine.

Many options have been built into the program for maximum flexibility for users. The software has selections to designate Baud Rate and serial ports in addition to options for controlling handshaking, maximum number of holes in a group, A codes, Metric conversions, halfsteps, tenth steps, leading and trailing zeros, relative or absolute coordinates, decimal point, Dyn coordinates, M30 trailer code and Per Cent sign header. A provision is also included (via Test Mode) to monitor the output.

It is possible to view the circuit board directly on the Macintosh screen. A Drill Bit Table is provided as an output file which includes tool codes, drill size and a hole count. The desk accessory, MockWrite, is included as a separate program with the Drill Tape Creator for printing drill tables and small drill files.

Procedure:

In order to run the program, first double click on the **Drill Tape Creator** icon.

You will see the title screen appear and then disappear.

Pull down the **FILE** menu and select **Open PCB**.

A file selection dialog box will be displayed with all the available boards shown. If the board you will be converting to drill tape format is on another disk, click on **Eject**, then insert the correct disk.

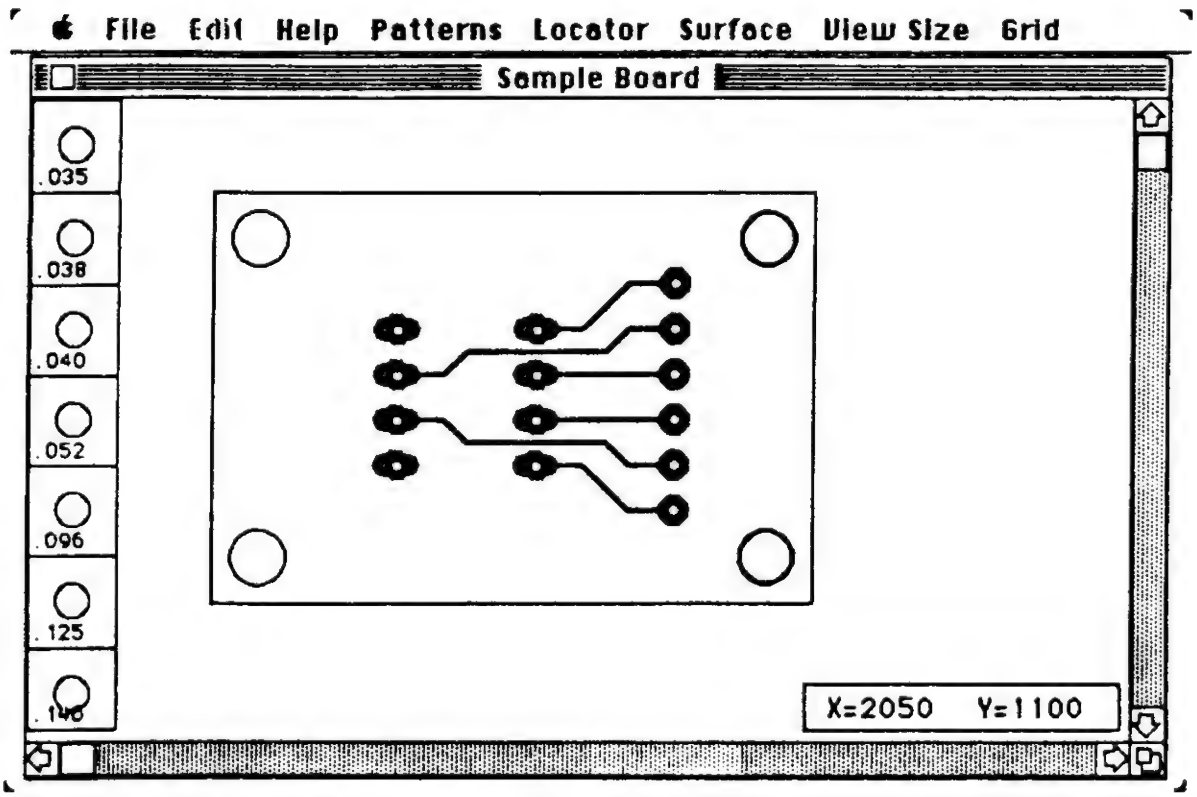
When the correct file has been highlighted on the screen, select **Open**.

A blank screen will be shown, and you will have several options.

1. If you want to see the board, select **Draw PCB** from the **FILE** pull-down menu.

   While the board is showing, you may use any of the many options available to change the view of the board. Most of the options function exactly as they do in the Layout programs. You may not, however, make any changes to the layout with this program.

   Shown here is the sample board supplied with this software.



PAPER TAPE PUNCH

We use and recommend the GNT 4601 Reader/Punch Combo from GNT Automatic. This is a very nice punch/reader combination which is very well suited to work with the tape program.

HARDWARE CONNECTION NOTES

Using the Standard Modem cable, the 25 pin DB connector pins have the following assignments:

Pin 7 - GND
Pin 2 - Data to the Punch or other output device
Pin 5 - Negative voltage to stop the output; Plus voltage to enable output.

FILE OUTPUT OPTIONS

When selecting output format, you have two selections: Thousandths or Inches. The Output Resource table below shows the options associated with the two Format selections. These options are found under STR# resource which can be accessed by ResEdit (a program from Apple Computer). To modify the resource, select the STR# corresponding to the ID numbers shown at the top of the table. Always make sure you have a backup before modifying your program. These changes should not be attempted by those unfamiliar with editing resources. For those who don't want to attempt this themselves, please send us your disk and a list of the desired output settings. We will make the changes for you.

Output File Option Selections

STR# ID=	502	501	_____	_____
Title	Inches	Thousandths	_____	_____
Max Holes:=	0	0	_____	_____
BaudRate	600	600	_____	_____
CTSshake:=	TRUE	TRUE	_____	_____
ACodes:=	FALSE	FALSE	_____	_____
Metric:=	FALSE	FALSE	_____	_____
HalfStep:=	FALSE	FALSE	_____	_____
TenthStep:=	FALSE	FALSE	_____	_____
LeadZero:=	FALSE	FALSE	_____	_____
TrailZero:=	FALSE	TRUE	_____	_____
RelCord:=	FALSE	FALSE	_____	_____
DynCord:=	TRUE	TRUE	_____	_____
M30 Trailer:=	TRUE	FALSE	_____	_____
PerCent Sign Header:=	TRUE	TRUE	_____	_____
DecPnt:=	TRUE	FALSE	_____	_____

SAMPLE OUTPUT

Bit Table

T1	.125"	4
T2	.035"	8
T3	.038"	6

Inches Output Format

%
T1
X1.4Y.3
Y.0
X.3
Y.3
T3
X1.2Y.5
Y.6
Y.7
Y.8
Y.9
Y.4
T2
X.6Y.8
X.9Y.5
Y.8
Y.6
X.6
X.9Y.7
X.6
Y.5
M30

Thousandths Output Format

%
T1
X1400Y300
Y1000
X300
Y300
T3
X1200Y500
Y600
Y700
Y800
Y900
Y400
T2
X600Y800
X900Y500
Y800
Y600
X600
X900Y700
X600
Y500

STOPPING THE OUTPUT

The output may be stopped anytime by pressing cmd . (holding down the CMD key and pressing the period key).

TEST MODE

Test mode is turned on or off by selecting **Test Mode** from the **FILE** pull-down menu. Using test mode allows inspecting each line of output generated by the program. As a line is generated, it is displayed on the screen. The program then waits for the actuation of the mouse button prior to proceeding to the next line of output. This feature allows monitoring of the drill output from the program.

HELP PULL-DOWN MENU

Under the **HELP** pull-down menu, there are several items which may assist you with on-line help. They are intended to keep you from having to find this manual when possible. If you think of other things which we should put in the Help menu which would help you or other users of this program, please let us know. We and the future users of the program would appreciate it!

SENDING DISK FILES OVER THE SERIAL PORT

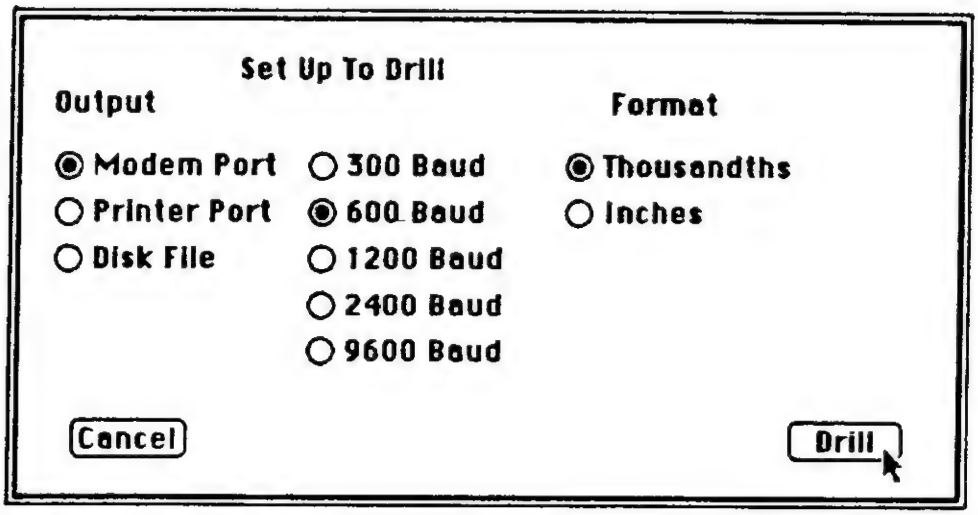
Files created with this program may be directly sent through one of the Macintosh serial ports or written to disk. After a file is written to disk, one of the options is to use this program again to send the disk file over one of the serial ports. To do so, select **Send File** from the **FILE** pull-down menu. Select the appropriate file from the File Selection dialog box, then select the output port and the Baud Rate from the Set-up dialog box. The file will then be sent over the selected port.

ROTATE 90 DEGREES

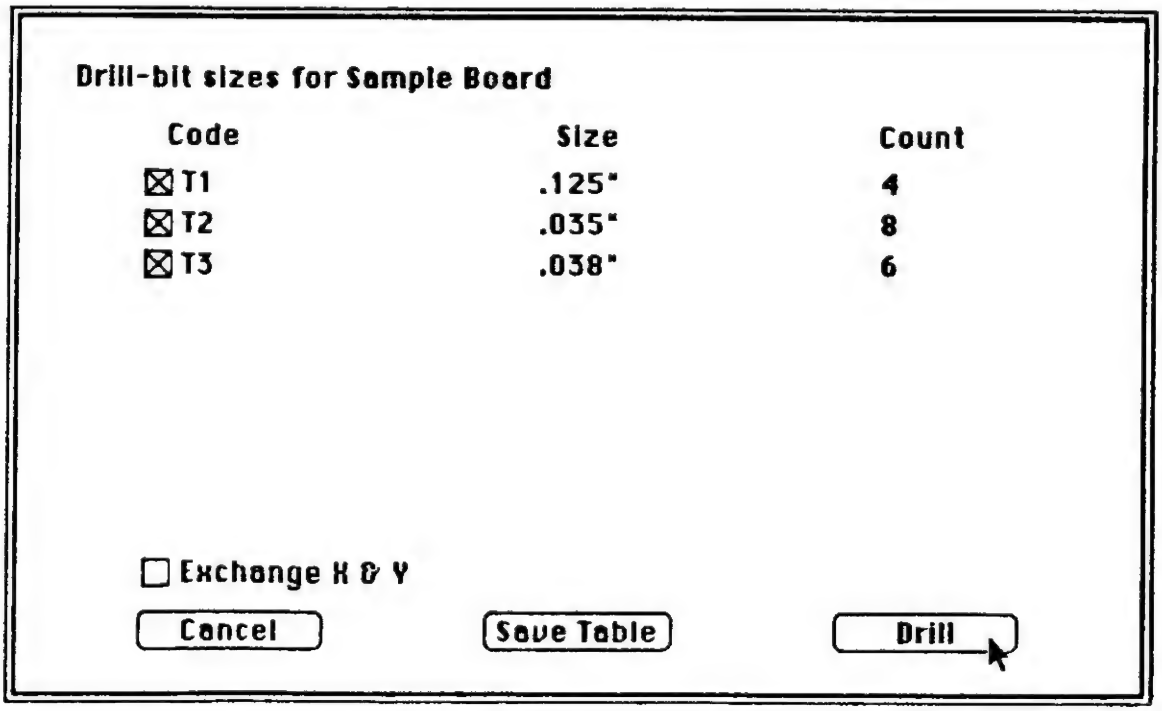
An option is provided to exchange the X and Y data which results in a 90 degree rotation on the drill table axis.

2. To monitor the programs output directly on the screen, you may enter the **Test Mode** by turning it on. For normal operation, **Test Mode** should be turned off. **Test Mode** is on when a check mark appears alongside the title in the **EDIT** pull-down menu.

3. To to send the file to disk or serial port, select Drill under the FILE pull-down menu. You will be presented with the following dialog box:



After making the appropriate selections, click on **Drill**. If you selected disk file, you will be asked for the drill file name. Next, the Drill code, bit size and hole count will be shown on the screen.



If you wish, you may also save a copy of the **Drill Bit Table** for later printing with **MockWrite**.

4. **Quit** the program.

Schematic Device Libraries

The Douglas Schematic Device Libraries contain symbols and simulation models for a wide range of industry-standard device types for use with the Douglas CAD/CAM Schematic package. Please read through the following notes, which provide some details on the use and limitations of these libraries.

An index to the individual devices is attached and appears in text file form on each library disk. We recommend keeping this index file on your disk and using it with a desk accessory such as Notepad+™ (part of Sidekick™ from Borland International) or MockWrite™ (from CE Software) to help you locate parts from within Schematic.

The 7400, 10K and 4000 series

The 7400, 10K and 4000 series libraries include devices with full simulation implemented. We have not attempted to match the delay characteristics of these devices, only the internal logic. These devices are Schematic macros, i.e. the devices are internally made up of primitive devices and PLAs. PLAs are used wherever possible for the sake of memory efficiency, but this means that delay characteristics of the devices will be different from what you might derive from the circuit in a data book. The Set Params command in Schematic can be used to determine the delay along the longest path through the device (see more information below). This should be taken into account when determining clock rates for circuit simulations.

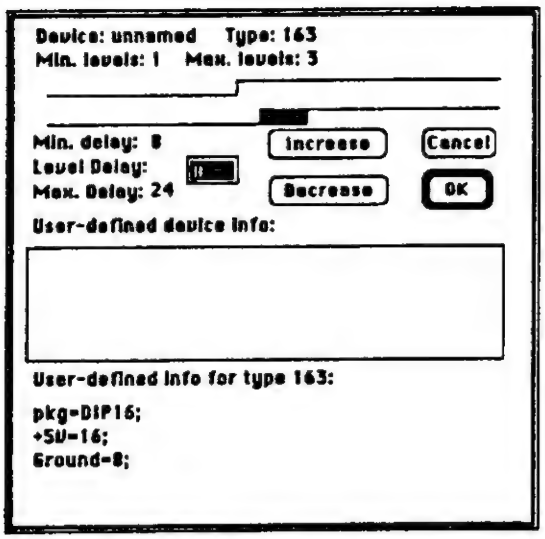
The LSI and Analog Libraries

The remaining libraries include devices in symbol-only form. In Schematic, all pins on these devices will behave as inputs for simulation purposes. If you wish to create a simulation model to go with any of these, you can attach a circuit to any symbol using the "New Circuit" feature in the Schematic Librarian. See the Schematic Librarian manual found in the Appendix of your Schematic manual for more information.

Device Delay

All internal devices are left with their default delay of one unit. Crude adjustments to the delay can be made in Schematic by selecting the device (by clicking on it) and using the Set Params command in the Options menu. Any change in this delay setting increments or decrements all internal devices by the same amount, so the exact effect depends on the circuit logic.

The Set Params display shows the delays associated with the shortest and longest paths through the device, as in the following example:



In this case the nominal delay for the 163 has been set to 8 units. Assuming no unusual adjustments have been made to the internal circuit, this means that the delay through each internal primitive device is 8 units. The "Min Levels" and "Max Levels" items give the number of primitive devices along the shortest and longest signal paths through the device, and "Min Delay" and "Max Delay" show the corresponding delays. See the Schematic manual for more information on Set Params and the delay calculation. Upcoming versions of Schematic will allow internal devices in macros to be adjusted individually for finer control of delay characteristics.

Setting One Shot and Clock Parameters

Schematic allows you to set parameters for One Shot and Clock Generator devices internal to macros (such as the one shots). Select the device by clicking on it and select Set Params from the Options menu. You will be prompted for each clock or one shot in the macro, then for the overall delay for the device.

Pin Numbering

Most of the symbols provided in these libraries include pin numbers, which are added to the pins automatically when Schematic reads a device from the library. The pin numbers can be changed in Schematic after the device is created using the pin numbering facility (Name command), or the defaults can be changed in the libraries using the Schematic Librarian.

Power and Ground Pins

Most devices contain user-defined info fields specifying power and ground connections and package type for the device based on the standard DIP packages. The contents of these fields has no significance to Schematic and is stored verbatim in the circuit files for use by external programs. For example, the user-defined info for a 74LS163 contains the following entries:

```
pkg=DIP16;
+5V=16;
Ground=8;
```

The "pkg=DIP16" entry specifies a package type code for use by the Douglas CAD/CAM PCB layout package. The "+5V" and "Ground" entries are used in conjunction with the SIGSOURCE option in the Schematic Reporter Form to create power and ground listings in a net list.

Modifying User-Defined Information Fields

If the package and power connection data don't suit your needs you can change it by one of two methods:

- use the Schematic Librarian to modify the data fields in the library itself (For safety only work with copies; do not modify the originals!).
- enter fields with the same name in the user-defined info for the device after it is placed in the circuit. This does not modify the library entry but it overrides any field with the same name in the device type information.

Sources of Information and Disclaimer

The device simulations are derived from functional specifications and other data in the following data books: The TTL Data Book for Design Engineers, Second Edition, Texas Instruments; The TTL Data Book Volume 2, 1985, Texas Instruments; ALS/AS Logic Data Book, 1986, Texas Instruments; LSI Logic Data Book, 1986, Texas Instruments; Intel Component Data Catalog; Motorola CMOS Data; Motorola Microprocessors Data Manual and others. Because we depend on these sources for information and do not have the resources to purchase and test every chip ourselves, we cannot accept any responsibility for the accuracy of these simulations. In cases where there are logic differences between LS, S, L, H, HC (etc) devices, we have based our circuitry on the LS logic.

Credits

The device simulations contained in these libraries were developed by Don Smith, Addam Smith, David Taylor, Chris Dewhurst, and Albert Yeung of Capilano Computing Systems Ltd.

Libraries Index

74xx SERIES TTL LIBRARIES

(1) Buffers/Bus Xcvr: Vol. I

226 - Quad Transceivers with storage
240 - Inverting Octal Buffer/Driver
241 - Noninverting Octal Buffer/Driver
242 - Inverting Quad Trasceiver
243 - Noninverting Quad Transceiver
244 - Noninverting Octal Buffer/Driver
245 - Octal Transceiver
440 - Quad Tridirection OC Transceiver
441 - Quad Tridirection OC Transceiver
442 - Quad Tridirection 3-state Transceiver
443 - Quad Tridirection 3-state Transceiver
444 - Quad Tridirection 3-state Transceiver
446 - Quad Tridirection 3-state Transceiver with individual direction controls
448 - Quad Tridirection OC Transceiver
449 - Quad Tridirection 3-state Transceiver with individual direction controls
540 - Inverting Octal Buffer/Driver
541 - Noninverting Octal Buffer/Driver
F588 - Octal Bidirectional Transceiver with 3-state inputs/outputs
795 - Octal 3-state Buffer with two octal enables
796 - Inverting Octal 3-state Buffer with two octal enables
797 - Octal 3-state Buffer with two quad enables
798 - Inverting Octal 3-state Buffer with two quad enables

(2) Bus Xcvr II: Vol. I

620 - Inverting Octal Bidirectional 3-state Latchable Transceiver
621 - Octal Bidirectional OC Latchable Transceiver
622 - Inverting Octal Bidirectional OC Latchable Transceiver
623 - Octal Bidirectional 3-state Latchable Transceiver
640 - Inverting Octal Bidirectional 3-state Transceiver
641 - Octal Bidirectional OC Transceiver
642 - Inverting Octal Bidirectional OC Transceiver
643 - Inv. & Non-inv. Octal Bidirectional 3-state Transceiver
644 - Inv. & Non-inv. Octal Bidirectional OC Transceiver
645 - Octal Bidirectional 3-state Transceiver

(3) Flip-Flops: Vol. III

109 - Dual JK-FF's with preset and clear
171 - Quad D-Flip-Flops with high and low outputs
174 - Hex D-FF's with high outputs only
175 - Quad D-FF's with high and low outputs
273 - Octal 2-state D-FF's with true data and clear
276 - Quad JK-FF's with high outputs only
374 - Octal 3-state D-FF's with true data
376 - Quad JK-FF's with high outputs only
377 - Octal 2-state D-FF's with true data and enable

378 - Hex D-FF's with high outputs only
379 - Quad D-FF's with high and low outputs
534 - Octal 3-state D-FF's with inverting
564 - Octal 3-state D-FF's with inverting
574 - Octal 3-state D-FF's with true data
575 - Octal 3-state D-FF's with true data and clear
576 - Octal 3-state D-FF's with inverting
577 - Octal 3-state D-FF's with inverting and clear
821 - 10-bit 3-state D-FF's with true data
822 - 10-bit 3-state D-FF's with inverting
823 - 9-bit 3-state D-FF's with true data
824 - 9-bit 3-state D-FF's with inverting
825 - Octal 3-state D-FF's with true data
826 - Octal 3-state D-FF's with inverting
874 - Octal 3-state D-FF's with true data and clear
876 - Octal 3-state D-FF's with inverting and preset
878 - Octal 3-state D-FF's with true data and clear
879 - Octal 3-state D-FF's with inverting and clear

(4) Latches: Vol. III
75 - Quad Dual 2-bit transparent with 2-state
77 - Quad Dual 2-bit transparent with 2-state
100 - Octal Dual 4-bit transparent with 2-state
116 - Octal Dual 4-bit transparent with 2-state
256 - Octal Dual 4-bit addressable 2-state
259 - Octal addressable 2-state
268 - Octal transparent 3-state
279 - S-R 2-state
373 - Octal transparent 3-state
375 - Quad Dual 2-bit transparent with 2-state
412 - Octal multimode buffered 3-state
533 - Octal inverting transparent 3-state
563 - Octal inverting transparent 3-state
573 - Octal transparent 3-state
580 - Octal inverting transparent 3-state
604 - Octal 2-input multiplexed 3-state
605 - Octal 2-input multiplexed OC
606 - Octal 2-input multiplexed 3-state
607 - Octal 2-input multiplexed OC
841 - 10-bit 3-state with true data
842 - 10-bit 3-state inverting
843 - 9-bit 3-state with true data
844 - 9-bit 3-state inverting
845 - 8-bit 3-state with true data
846 - 8-bit 3-state inverting
873 - Octal Dual 4-bit transparent with 3-state
880 - Octal Dual 4-bit inverting transparent 3-state

(5) Selct/Mplxrs: Vol. II
98 - Quad 2 to 1 with storage and 2-state
150 - 16 to 1 with 2-state

151 - 8 to 1 with 2-state
152 - 8 to 1 with 2-state
153 - Dual 4 to 1 with 2-state
157 - Quad 2 to 1 with 2-state
158 - Quad 2 to 1 with 2-state
251 - 8 to 1 with 3-state
253 - Dual 4 to 1 with 3-state
257 - Quad 2 to 1 with 3-state
258 - Quad 2 to 1 with 3-state
298 - Quad 2 to 1 with storage and 2-state
351 - Dual 8 to 1 with 3-state
352 - Dual 4 to 1 with 2-state
353 - Dual 4 to 1 with 3-state
354 - 8 to 1 with 3-state
355 - 8 to 1 with 2-state
356 - 8 to 1 with 3-state
357 - 8 to 1 with OC
398 - Quad 2 to 1 with storage and 2-state
399 - Quad 2 to 1 with storage and 2-state
604 - Octal 2 to 1 with storage and 3-state
605 - Octal 2 to 1 with storage and OC
606 - Octal 2 to 1 with storage and 3-state
607 - Octal 2 to 1 with storage and OC
850 - 16 to 1 with 3-state
851 - 16 to 1 with 3-state

(6) Decd/Encd: Vol. I

42 - 4 to 10, BCD to Decimal with 2-state decoder
43 - 4 to 10 Excess 3 to Decimal with 2-state decoder
44 - 4 to 10 Excess 3 Gray to Decimal with 2-state decoder
137 - 3 to 8 with address latches and 2-state decoder
138 - 3 to 8 with 2-state decoder
139A - Dual 2 to 4 with 2-state, 139A & B make up 139 decoder
139B
147 - Full BCD Priority Encoder
148 - Cascadable Octal Priority Encoder
154 - 4 to 16 3-state Decoder
155 - Dual 2 to 4 2-state Decoder
156 - Dual 2 to 4 OC Decoder
159 - 4 to 16 OC Decoder
184 - 6 line BCD to 6 line binary Converter
185 - 6 line BCD to 6 line BCD Converter
278 - 4-bit Cascadable with register Priority Encoder
348 - Cascadable Octal with 3-state output Priority Encoder
F537 - 1 of 10 BCD decoder with polarity and 3-state outputs
F538 - 1 of 8 decoder with polarity and 3-state outputs
F539 - Dual 1 of 4 decoder with polarity and 3-state outputs
748 - Cascadable Octal Priority Encoder (148 with deglitcher)
848 - Cascadable Octal with 3-state output Priority Encoder (348 with deglitcher)

(7) Decdr/Drvr: Vol. I

45 - BCD to Decimal OC Display Decoder/Driver
46 - BCD to Seven Segment OC Display Decoder/Driver
47 - BCD to Seven Segment OC Display Decoder/Driver
48 - BCD to Seven Segment OC Display Decoder/Driver
49 - BCD to Seven Segment OC Display Decoder/Driver
141 - BCD to Decimal OC Display Decoder/Driver
145 - BCD to Decimal OC Display Decoder/Driver
246 - BCD to Seven Segment OC Display Decoder/Driver
247 - BCD to Seven Segment OC Display Decoder/Driver
248 - BCD to Seven Segment OC Display Decoder/Driver
249 - BCD to Seven Segment OC Display Decoder/Driver
347 - BCD to Seven Segment OC Display Decoder/Driver
445 - BCD to Decimal OC Display Decoder/Driver
447 - BCD to Seven Segment OC Display Decoder/Driver

(8) Shift Reg I: Vol. III
91 - 8-bit Serial In/Out with shift right
94 - 4-bit Serial In/Out with shift right & load
95 - 4-bit Parallel In/Out with shift right & load
96 - 5-bit Parallel In/Out with shift right & load
99 - 4-bit Parallel In/Out with shift right & load
164 - 8-bit Serial In/Parallel Out with shift right
165 - 8-bit Parallel In/Serial Out with shift right,load & hold
166 - 8-bit Parallel In/Serial Out with shift right,load & hold
178 - 4-bit Parallel In/Out with shift right,load & hold
179 - 4-bit Parallel In/Out with shift right,load & hold
194 - 4-bit Parallel In/Out with shift left/right,load & hold
195 - 4-bit Parallel In/Out with shift right & load
198 - 8-bit Parallel In/Out with shift left/right,load & hold
199 - 8-bit Parallel In/Out with shift right,load & hold
295 - 4-bit Parallel In/Out with shift right & load
299 - 8-bit Parallel In/Out with shift left/right,load & hold
322 - 8-bit Sign Protected shift right,load & hold
323 - 8-bit Parallel In/Out with shift left/right,load & hold
395 - 4-bit Parallel In/Out with shift right & load
671 - 4-bit Parallel In/Out with shift left/right,load,hold & 3-state
672 - 4-bit Parallel In/Out with shift left/right,load,hold & 3-state
673 - 16-bit Serial In/Parallel Out with shift right,load & hold
674 - 16-bit Parallel In/Serial Out with shift right,load & hold

(9) Shift Reg II: Vol. III
170 - 4-words x 4-bits OC register file
172 - 8-words x 2-bits 3-state register file
173 - Quadruple Bus Buffer register
350 - 4-bit 3-state shifter
396 - Octal storage register
589 - 8-bit Parallel In/Serial Out with 3-state & Input latches
594 - 8-bit Serial In/Parallel Out with buffered output latches
595 - 8-bit Serial In/Parallel Out with 3-state output latches
596 - 8-bit Serial In/Parallel Out with OC output latches
597 - 8-bit Parallel In/Serial Out with 3-state & Input latches

598 - 8-bit Parallel I/O ports with 3-state & Input latches & multiplexed Serial Inputs
599 - 8-bit Serial In/Parallel Out with OC output latches
670 - 4-words x 4-bits 3-state register file

(10) Counters I: Vol. II
56 - 50 to 1 frequency Divider
57 - 60 to 1 frequency Divider
68 - Asynch. neg. edge triggered Decade
69 - Asynch. neg. edge triggered 4-bit Binary
90 - Asynch. neg. edge triggered Set-to-9 Decade
92 - Asynch. neg. edge triggered Divide-by-12
93 - Asynch. neg. edge triggered 4-bit Binary
97 - 60-bit Binary Rate Multiplier
160 - Sync. pos. edge trigger sync. parallel load Decade
161 - Sync. pos. edge trigger sync. parallel load Binary
162 - Sync. pos. edge trigger sync. parallel load Decade
163 - Sync. pos. edge trigger sync. parallel load Binary
167 - Sync. pos. edge trigger async. parallel load Decade Rate Muliplier
168 - Sync. pos. edge trigger sync. parallel load Decade Up/Down
169 - Sync. pos. edge trigger sync. parallel load Binary Up/Down
176 - Asynch. neg. edge triggered parallel load Decade
177 - Asynch. neg. edge triggered parallel load 4-bit Binary
190 - Sync. pos. edge trigger async. parallel load Decade Up/Down
191 - Sync. pos. edge trigger async. parallel load Binary Up/Down
192 - Sync. pos. edge trigger async. parallel load Decade Up/Down
193 - Sync. pos. edge trigger async. parallel load Binary Up/Down
196 - Asynch. neg. edge triggered parallel load Decade
197 - Asynch. neg. edge triggered parallel load 4-bit Binary
290 - Asynch. neg. edge triggered Set-to-9 Decade
293 - Asynch. neg. edge triggered 4-bit Binary
390 - Asynch. neg. edge triggered Dual Decade
393 - Asynch. neg. edge triggered Dual 4-bit Binary
490 - Asynch. neg. edge triggered Set-to-9 Dual Decade

(11) Counters II: Vol. II
560 - Sync. pos. edge trigger sync. parallel load Decade
561 - Sync. pos. edge trigger sync. parallel load Binary
568 - Sync. pos. edge trigger sync. parallel load Decade Up/Down
569 - Sync. pos. edge trigger sync. parallel load Binary Up/Down
590 - 8-bit Binary with registered parallel outputs & 3-state
591 - 8-bit Binary with registered parallel outputs & OC
592 - 8-bit Binary with registered parallel inputs and 2-state
593 - 8-bit Binary with registered parallel I/O and 3-state
668 - Sync. pos. edge trigger sync. parallel load Decade
669 - Sync. pos. edge trigger sync. parallel load Binary
690 - Sync. pos. edge trigger sync. parallel load Decade
691 - Sync. pos. edge trigger sync. parallel load Binary
692 - Sync. pos. edge trigger sync. parallel load Decade
693 - Sync. pos. edge trigger sync. parallel load Binary
696 - Sync. pos. edge trigger sync. parallel load Decade Up/Down
697 - Sync. pos. edge trigger sync. parallel load Binary Up/Down

698 - Sync. pos. edge trigger sync. parallel load Decade Up/Down
699 - Sync. pos. edge trigger sync. parallel load Binary Up/Down
716 - Programmable Modulo-N Counter Decimal
718 - Programmable Modulo-N Counter Hex
867 - 8-bit Binary Up/Down with async. clear
869 - 8-bit Binary Up/Down with sync. clear

(12) Compare: Vol. I
85 - 4-bit 2-state outputs with P=Q & P>Q carry in
L85 - 4-bit 2-state outputs with P=Q & P>Q carry in
518 - 8-bit OC output & output enable with P=Q carry in
519 - 8-bit OC output & output enable with P=Q carry in
520 - 8-bit 2-state output & output enable with P<>Q carry in
521 - 8-bit OC output & output enable with P<>Q carry in
522 - 8-bit OC output & output enable with P<>Q carry in
682 - 8-bit 2-state output with P=Q & P>Q carry in
683 - 8-bit OC output with P=Q & P>Q carry in
684 - 8-bit 2-state output with P=Q & P>Q carry in
685 - 8-bit OC output with P=Q & P>Q carry in
686 - 8-bit 2-state output & output enable with P=Q & P>Q carry in
687 - 8-bit OC output & output enable with P=Q & P>Q carry in
688 - 8-bit 2-state output & output enable with P<>Q & P<Q carry in
689 - 8-bit OC output & output enable with P<>Q carry in
866 - 8-bit 2-state output, output enable, latched P & with P=Q,P>Q & P<Q carry in
885 - 8-bit latched output, output enable, latched P & Q with P>Q & P<Q carry in

(13) One-Shots: Vol. II
121 - Single Monostable Multivibrator
122 - Single Retriggerable Monostable Multivibrator
123 - Dual Retriggerable Monostable Multivibrator
130 - Single Retriggerable Monostable Multivibrator
221 - Dual Monostable Multivibrator
422 - Single Retriggerable Monostable Multivibrator
423 - Dual Retriggerable Monostable Multivibrator

(14) Arithmetic/Parity/ALUs/CPGs: Vol. I
80 - 1-bit gated parallel Binary Adder
82 - 2-bit gated parallel Binary Adder
83 - 4-bit gated parallel Binary Adder
87 - 4-bit True/Complement Element
97 - 6-bit Binary Rate Multiplier
167 - 6-bit Decade Rate Multiplier
180 - 9-bit Odd/Even Parity Generator/Checker with parity in
181 - 4-bit 32 function ALU
182 - 16-bit Look-Ahead Carry Block
183 - Dual 1-bit carry-save parallel Binary Adder
261 - 2 x 4-bit Parallel Binary Multiplier
280 - 9-bit Odd/Even Parity Generator/Checker
282 - 16-bit Look-Ahead Carry Block
283 - 4-bit gated parallel Binary Adder
284 - 4 x 4-bit Parallel Binary Multiplier
285 - 4 x 4-bit Parallel Binary Multiplier

286 - 9-bit Odd/Even Parity Generator/Checker
385 - Quad Serial Adder/Subtractor
882 - 32-bit Look-Ahead Carry Block

(15) Knick Knacks: Vol. I
(Used internally in other macros)

LATCH1
LATCH2
TEST_CLK
TFF1 - T Flip-Flop
TFF2 - T Flip-Flop with clear/set
SRFF1 - Set/Reset Flip-Flop

4000 CMOS Series Devices:
1) Arith:
4008 - 4 bit Full Adder
4032 - Triple Serial Adder, active high
4038 - Triple Serial Adder, active low
4554 - 2 x 2 bit Parallel Binary Multiplier
4560 - NBCD Adder
4561 - 9`s Complementer
4581 - 4 bit ALU
4582 - Look-Ahead Carry Block
4585 - 4 bit Magnitude Comparator

2) Counters:
4017 - Decade counter/divider
4018 - Presettable Divide-by-N
4020 - 14 bit binary up
4022 - Octal counter/divider
4029 - 4 bit Presettable Up/Down
4040 - 12 bit binary up
4160 - Decade counter with Asynch. clear
4161 - Binary counter with Asynch. clear
4162 - Decade counter with Synch. clear
4163 - Binary counter with Synch. clear
4510 - BCD Up/Down
4516 - Binary Up/Down
4518 - Dual BCD Up
4520 - Dual Binary Up
4522 - Programmable BCD Divide-by-N
4526 - Programmable Binary Divide-by-N

3) Decd/Encd/Mux:
4028 - BCD to Decimal DEC
4512 - 8 channel Data Selector/MUX
4514 - 4 bit Latch/ 4-to-16 DEC, active high
4515 - 4 bit Latch/ 4-to-16 DEC, active low
4532 - 8 bit Priority ENC
4539 - Dual 4 channel Data Selector

4555 - Dual Binary to 1-of-4 DEC, active high
4556 - Dual Binary to 1-of-4 DEC, active low
4558 - BCD-to-7 Segment DEC

4) Latches/Regs:
4043 - Quad NOR R-S Latch
4044 - Quad NAND R-S Latch
4076 - Quad D-type REG
4174 - Hex D Flip-Flop
4175 - Quad D Flip-Flop

5) Misc.:
4506 - Dual Expandable AND-OR-INVERT Gate
4519 - 4 bit AND/OR Selector
4530 - Dual 5-input Majority Logic Gate
4531 - 12 bit Parity Tree

6) Shift Regs:
4014 - 8 bit Static
4015 - Dual 5 bit
4035 - 4 bit
4194 - 4 bit Universal

INTEL LSI Libraries Index:
1) Microprocessors:
8048 - HMOS Single Component 8-bit Microcomputer
8080 - 8-bit N-Channel Microprocessor
8085 - Single Chip 8-bit N-Channel Microprocessor
8086 - 16-bit HMOS Microprocessor
8087 - 80-bit HMOS Numerical Data Processor
8088 - 8-bit HMOS Microprocessor
8089 - 16-bit HMOS I/O Processor
8155 - 2048 x 1 bit Static MOS RAM with I/O Ports and Timer
8156 - 2048 x 1 bit Static MOS RAM with I/O Ports and Timer
8237 - High Performance Progammable DMA Controller
8257 - Progammable DMA Controller
8259 - Programmable Interrupt Controller
8284 - Clock Generator and Driver for 8086/88/89 Processors
8288 - Bus Controller for 8086/88/89 Processors
8289 - Bus Arbiter
8355 - 2048 x 8 bit ROM with I/O
80286 - High Performance Microprocessor with Memory Management and Protection
80287 - 80-bit HMOS Numeric Processor Extension
80386 - High Performance 32-bit CHMOS Microprocessor with Integrated Memory Management
80387 - 80-bit CHMOS III Numeric Processor Extension
82258 - Advanced Direct Memory Access Coprocessor
82284 - Clock Generator and Ready Interface for 80286 Processors
82288 - Bus Controller for 80286 Processors
82289 - Bus Arbiter for 80286 Processor Family
82384 - Clock Generator and Reset Interface for 80386 Processors

2) Peripherals:
8203 - 64k Dynamic RAM Controller

8206 - Error Detection and Correction Unit
8207 - Dual-Port Dynamic RAM Controller
8208 - Dynamic RAM Controller
8231A - Arithmetic Processing Unit
8243 - MCS-48 Input/Output Expander
8251A - Progammable Communication Interface
8253 - Programmable Interval Timer
8254 - Programmable Interval Timer
8255 - Programmable Peripheral Interface
8256 - Multifunction Microprocessor Support Controller
8272 - Single/Double Density Floppy Disk Controller
8275 - Programmable CRT Controller
8276 - Small System CRT Controller
8279 - Programmable Keyboard/Display Interface
82064 - Winchester Disk Controller with On-Chip Error Detection and Correction
82072 - High Integration Floppy Disk Controller
82716 - Video Storage Display Device
82730 - Text Coprocessor
82786 - Graphics Coprocessor

3) Memories:
2716 2k x 8 EPROM
2732 4k x 8 EPROM
2764 8k x 8 EPROM
27128 16k x 8 EPROM
27256 32k x 8 EPROM
27512 64k x 8 EPROM

Motorola LSI Libraries Index:
1) Memories:
5101 - 256 x 4 bit RAM
6504 - 4096 x 1 bit Static RAM
6508 - 1024 x 1 bit RAM
6514 - 1024 x 4 bit Static RAM
6518 - 1024 x 1 bit RAM
6818 - Real-Time Clock RAM
6819 - Real-Time Clock RAM

2) Microcomputers/Microprocessors:
6800 - 8-bit Microprocessor Unit
6801 - 8-bit Microcomputer/Microprocessor Unit and 2K ROM
6802 - 8-bit Microprocessor with Clock and optional RAM
6803 - 8-bit Microcomputer/Microprocessor Unit
6805E2 - Microprocessor with Expansion Bus
6805F2 - Microprocessor with 1.1K ROM
6805P2 - 8-bit HMOS 1K single-chip Microcomputer
6805P4 - 8-bit HMOS 2K Microcomputer
6805R2 - 8-bit HMOS 2K single-chip Microcomputer with A/D
6805T2 - 8-bit HMOS 2K single-chip Microcomputer with PLL
6805U2 - 8-bit HMOS 2K single-chip Microcomputer
6808 - 8-bit Microprocessor with Clock and optional RAM
41000 - One-Chip Microcomputer
41099 - 4-bit Microprocessor Unit

41200 - ONe-Chip Microcomputer

3) Interface Adapters/Controllers:
6821 - Peripheral Interface Adapter
6828 - Priority Interrupt Controller
6829 - Memory Management Unit
6844 - Direct Memory Access Controller
6845 - CRT Controller
6846 - ROM-I/O-Timer
6852 - Synchronous Serial Data Adapter

Linear Libraries (National Semi)
These devices are not numbered/named, as one package can cover many devices.
Find the one that most closely matches the one needed and name it accordingly.

(1) Op Amp/V_Reg
3-Pin V_Reg - Voltage Regulator - ex. LM78XX
3-Pin Adj V_Reg - Adjustable Voltage Regulator - ex. LM138
LMx05 - Positive Multi-Terminal Adjustable Voltage Regulator
LMx524 - Regulating Pulse Width Modulator Switching Voltage Regulator

LM347 - Wide Bandwidth Quad JFET Input Op Amp
LM351 - Wide Bandwidth JFET Input Op Amp
LM353 - Wide Bandwidth Dual JFET Input Op Amp
LMx01 - General Purpose, Uncompensated Op Amp
LM2x01 - Dual High Performance Op Amp
LMx02 - Voltage Follower
LMx07 - General Purpose, Compensated Op Amp
LMx08 - Low Power Op Amp
LMx08 w/ GUARD - Low Power Op Amp with input anti-leakage guard connection
LM2x08 - Dual Super Beta Op Amp
LMx12 - Low Power Op Amp
LMx18 - High Speed Op Amp
LMx43 - High Voltage Op Amp
LMx46 - Low Power Programmable Quad Op Amp
LMx59 - Dual, High Speed, Programmable Norton Op Amp
LMx16 w/ GUARD - High Input Impedance Op Amp
LM709 - General Purpose, Uncompensated Op Amp
LM725 - Low Drift Instrumentation Op Amp
LMx47 - Dual General Purpose, Compensated Op Amp
LM4250 - Programmable Op Amp
LM24250 - Dual Micropower Programmable Op Amp
LM13080 - Programmable Power Op Amp

(2) ADCs/DACs/Voltage Comps/Analog Switches
LMx06 - Voltage Comparator
LMx11 - Voltage Comparator
LM2x11 - Dual Voltage Comparator
LMx19 - High Speed Dual Comparator
LMx60 - High Speed Differential Comparator
LMx61 - High Speed Differential Comparator

LM1133x - 4 Normally Open/Closed Analog Switches with Disable

LM1x20x - 4 Normally Open Analog Switches
LM1x508 - 8-Channel Analog Multiplexer
LM1x509 - 4-Channel Differential Analog Multiplexer

AD75x0 - 10-bit Binary Multiplying D/A Converter
AD75x1 - 12-bit Binary Multiplying D/A Converter
ADB1200 - 12-bit Binary A/D Building Block
ADC0800 - 8-bit A/D Converter
ADC080x - 8-bit µP Compatible A/D Converter
ADC0808/9 - 8-bit µP Compatible A/D Converter with 8-Channel Multiplexer
ADC0816/7 - 8-bit µP Compatible A/D Converter with 16-Channel Multiplexer
ADC1210/1 - 12-bit CMOS A/D Converter
DAC0800 - 8-bit D/A Converter
ADC080x - 8-bit D/A Converter
ADC1000-2 - 10-bit µP Compatible, Double-Buffered D/A Converter
ADC1003-8 - 10-bit µP Compatible, Double-Buffered D/A Converter
DAC102x - 10-bit Binary Multiplying D/A Converter
DAC122x - 12-bit Binary Multiplying D/A Converter
DAC120x - 12-bit (Binary/BCD) D/A Converter
DAC128x - 12-bit (Binary/BCD) D/A Converter

MECL 10K Series Libraries
(1) Buffers, Inverters and Translators
188 - Hex Buffer with Enable
189 - Hex Inverter with Enable
195 - Hex Inverter/Buffer

(2) Counters and ALUs
016 - 4-bit Binary Counter
136 - Universal Hexidecimal Counter
137 - Universal Decade Counter
138 - Bi-Quinary Counter
154 - Binary Counter
166 - 5-bit Magnitude Comparator
178 - Binary Counter
179 - Look-Ahead Carry Block
180 - Dual 2-bit Adder/Subtractor
181 - 4-bit Arithmetic Logic Unit/Function Generator
182 - 2-bit Arithmetic Logic Unit/Function Generator
183 - 4 x 2 Multiplier
287 - High Speed 2 x 1 bit Array Multiplier Block

(3) Encoders and Decoders
161 - Binary to 1-8 Decoder (LOW)
162 - Binary to 1-8 Decoder (HIGH)
165 - 8-input Priority Encoder
171 - Binary to 1-4-Decoder (LOW)
172 - Binary to 1-4-Decoder (HIGH)

(4) Flip-Flops
130 - Dual Latch
131 - Dual Type Master-Slave Flip-Flop
133 - Quad Latch

135 - Dual J-K Master-Slave Flip-Flop
153 - Quad Latch
168 - Quad Latch
175 - Quint Latch
176 - Hex D Master-Slave Flip-Flop
186 - Hex D Master-Slave Flip-Flop with Reset
231 - High Speed Dual Type D Master-Slave Flip-Flop

(5) Gates
100 - Quad 2-input NOT Gate with Strobe
101 - Quad OR/NOR Gate
102 - Quad 2-input NOR Gate
103 - Quad 2-input OR Gate
104 - Quad 2-input AND Gate
105 - Triple 2-3-2-input OR/NOR Gate
106 - Triple 4-3-3-input NOT Gate
107 - Triple 2-input Exclusive OR/Exclusive NOR
109 - Dual 4-5-input OR/NOR Gate
110 - Dual 3-input 3-output OR Gate
111 - Dual 3-input 3-output NOR Gate
113 - Quad Exclusive OR Gate
117 - Dual 2-wide 2-3-input OR-AND/OR-AND-INVERT Gate
118 - Dual 2-wide 3-input OR-AND Gate
119 - 4-wide 4-3-3-3-input OR-AND Gate
121 - 4-wide OR-AND/OR-AND-INVERT Gate
197 - Hex AND Gate
209 - Dual 4-5-input OR/NOR Gate
210 - Dual 3-input 3-output OR Gate
211 - Dual 3-input 3-output NOR Gate
212 - High Speed Dual 3-input 3-output OR/NOR Gate

(6) Parity Checkers and Error Detectors
160 - 12-bit Parity Generator-Checker
163 - Error Detection-Correction Circuit (IBM)
170 - 9 + 2-bit Parity Generator-Checker
193 - Error Detection-Correction Circuit (MOTOROLA)

(7) Shift Registers, One Shots and Multiplexers
132 - Dual Multiplexer with Latch and Common Reset
134 - Dual Multiplexer with Latch
141 - Four-Bit Universal Shift Register
158 - Quad 2-input Multiplexer
159 - Quad 2-input Multiplexer (Inverting)
164 - Eight-Line Multiplexer
173 - Quad 2-input Multiplexer/Latch
174 - Dual 4 to 1 Multiplexer
198 - Monostable Multivibrator
330 - Quad Bus Driver/Receiver with 2 to 1 Output Multiplexers
332 - Dual Bus Driver/Receiver with 4 to 1 Output Multiplexers

Z80 LSI Libraries Index:
1) Z80:
Z80 CPU - 8-bit Microprocessor